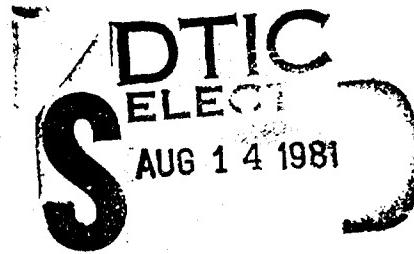


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SELECTED BIBLIOGRAPHY ON OPTIMIZING  
TECHNIQUES IN STATISTICS.

by

J. S. RUSTAGI

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Technical Report No. 240-8

Department of Statistics  
The Ohio State University  
Columbus, Ohio 43210

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  Bibliography, statistical optimization.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A selected list of references is provided in the area of optimization techniques as applied in statistical settings. The bibliography is classified according to various optimization techniques as well as to the kinds of statistical applications. Statistical areas include design of experiments, estimation and tests of hypotheses, least-squares theory, regression analysis, multivariate analysis, sampling, sequential and search procedures, and stochastic approximation methods.		

Optimizing techniques are extensively used in many areas of science and engineering. Many important problems in business, industry and government are formulated as optimization problems. Topics in optimization constitute an essential area of study in disciplines such as Operations Research, Chemical Engineering, Electrical Engineering, and Economics. Statistical techniques often become applications of optimization. Statistical procedures of estimation such as least squares, maximum likelihood, minimum variance, are associated with optimization by their very description. In other areas of Statistics such as decision theory, design of regression experiments, sampling, and data analysis, optimization plays a central role.

The importance of optimization has been recognized by research workers in statistics and related fields, resulting in conferences and symposia during the past few years. The proceedings of the symposia on Optimizing Methods in Statistics are available in the literature, Rustagi (1971, 1979). Sessions are held on Optimization quite frequently at the national and international meetings of the Operations Research Society of America, Institute of Management Sciences and Institute of Mathematical Statistics. A special issue of a journal on Optimization is also available, Rustagi (1978). A collection of recent research on Optimization in Statistics with special applications in management sciences and operations research is in Rustagi and Zanakis (1981).

Optimizing techniques can be broadly classified as (i) general classical, (ii) numerical, (iii) mathematical programming, and (iv) variational. We provide pertinent references with statistical applications in the above areas in Part I.

Part II of the bibliography will be concerned with various areas of statistics where optimization techniques are applied. We provide references of optimization in the following areas.

- (i) Design of Experiments
- (ii) Estimation and Testing Hypotheses
- (iii) Least Squares Theory
- (iv) Regression Analysis
- (v) Multivariate Analysis
- (vi) Sampling
- (vii) Sequential and Search Procedures
- (viii) Stochastic Approximation Methods.

The search has been made through the most recent statistical literature (the last twenty years).

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PART I

(i) General, Classical

Box, M. J. (1966). A comparison of several current optimization methods and the use of transformations in constrained problems, Comput. J. 9, 66-67.

Bremerman, J. H. (1970). A method of unconstrained global optimization, Math. Biosci. 9, 1.

Callahan, J. R. and Bector, C. R. (1975). Optimization with general stochastic objective function, Z. Angew. Math. Mech. 55, 528-530.

Charnes, A. and Cooper, W. W. (1969). Deterministic equivalents for optimizing and satisfying under chance constraints, Economic Models, Estimation and Risk (Essays in honor of Gerhard Tintner), Springer, Berlin, 425-455.

Davidon, W. C. (1976). Optimization vs. quadratic approximation in statistics, P. Comp. Sc. Statist. 9, 158-160.

Denton, F. T. (1971). Adjustment of monthly or quarterly series to annual totals: An approach based on quadratic minimization, J. Amer. Statist. Assoc. 66, 99-102.

Dubins, L. E. and Meilijson, I. (1974). On stability for optimization problems, Ann. Prob. 3, 243-255.

Fiacco, A. V. and Kortanek, K. O. (Editors) (1980). Extremal methods and systems analysis, Springer-Verlag, New York.

Haarhoff, P. C. and Buys, J. D. (1970). A new method for the optimization of a nonlinear function subject to nonlinear constraints, Comput. J. 13, 178-184.

Hancock, H. (1917). Theory of maxima and minima, Ginn and Co., New York (Dover, New York, 1960).

Lagrange, Conte J. L. (1759). Researches sur la methode de maximis et minimis, Miscellanea Taurinensiz 1, 3-20.

Peckham, G. (1970). A new method for minimizing a sum of squares without calculating gradients, Comput. J. 13, 418-420.

Ramsay, J. O. (1970). A family of gradient methods for optimization, Comput. J. 13, 413-417.

Richards, F.S.G. (1967). On finding local maxima of functions of a real variable, Biometrika 54, 310-311.

- Rustagi, J. S. (Editor) (1978). Special issue on optimization in statistics, Commun. Statist. - Simula Computa B 7, 303-435.
- Rustagi, J. S. (Editor) (1971). Optimizing methods in statistics, Academic Press, New York.
- Rustagi, J. S. (Editor) (1979). Optimizing methods in statistics, Academic Press, New York.
- Rustagi, J. S. and Zanakis, S. (Editors) (1981). Optimization in Statistics - TSMS Advanced Studies in Management Sciences, North-Holland Publishing Company, Amsterdam. (To appear.)
- Spang, H. A. (1962). A review of minimization techniques for nonlinear functions, SIAM Review 4, 343-365.
- Zoutendijk, G. (1959). Maximizing a function in a convex region, J. R. Statist. Soc B 21, 338-355.
- Zwart, P. B. (1974). Global maximization of a convex function with linear inequality constraints, Oper. Res. 22, 602.

#### (ii) Numerical Procedures

- Anbar, D. (1978). A stochastic Newton-Raphson method, J. Statist. Planning Inf. 2, 153-163.
- Andersen, E. B. (1972). The numerical solution of a set of conditional estimation equations, J. R. Statist. Soc. B 34, 42-54.
- Chandler, J. P. (1972). On an iterative procedure for estimating functions when both variables are subject to error, Technometrics 14, 71-76.
- Crockett, J. B. and Chernoff, H. (1955). Gradient methods of maximization, Pacific J. Math. 5, 33-50.
- Csiszar, I. (1975). I-divergence geometry of probability distributions and minimization problems, Ann. Prob. 3, 146-158.
- Curry, H. B. (1944). The method of steepest descent for nonlinear minimization problems, Quart. App. Math. 2, 258-261.
- Forsythe, G. (1955). Computing constrained minima with Lagrange multipliers, J. Soc. Indust. Appl. Math. 3, 173-178.
- Griffeath, D. S. (1972). Computer solution of the discrete maximization entropy problem, Technometrics, 14, 891-897.
- Harter, H. L. and Moore, A. H. (1966). Iterative maximum-likelihood estimation of the parameters of normal populations from singly and doubly censored samples, Biometrika 53, 205-213.

- Hartley, H. O. (1961). The modified Gauss-Newton method for the fitting of nonlinear regression functions, Technometrics 3, 269-280.
- Hooke, R. and Jeeves, T. A. (1961). Direct search solutions of numerical and statistical problems, J. Assoc. Comput. Mach. 8, 212-219.
- Jennrich, R. J. and Sampson, P. F. (1976). Newton-Raphson and related algorithms for maximum likelihood variance component estimation, Technometrics 18 (1), 11-17.
- Kale, B. K. (1962). On the solutions of likelihood equations by iterative processes, the multiparameter case, Biometrika 49, 479-486.
- Kennedy, Jr., W. J. and Gentle, J. E. (1980). Statistical computing, Marcel Dekker, New York, 425-548.
- Kiefer, J. (1953). Sequential minimax search for a maximum, Proc. Amer. Math. Soc. 4, 502-506.
- Kunz, H. P., Tzsachach, H. G. and Zehnder, C. A. (1968). Numerical methods of mathematical optimization, Academic Press, New York.
- Kushner, H. J. and Gavin, T. (1973). Extensions of Kesten's adaptive stochastic approximation method, Ann. Statist. 1, 851-861.
- Matthews, A. and Davies D. (1971). A comparison of modified Newton methods for unconstrained optimization, Comput. J. 14, 293-294.
- McCabe, G. P. (1975). Computations for variable selection in discriminant analysis, Technometrics 17 (1).
- Morgan, B.J.T. and Titterington, D. M. (1977). A comparison of iterative methods for obtaining maximum likelihood estimates in contingency tables with a missing diagonal, Biometrika 64, 265-270.
- Mortensen, R. E. (1968). Maximum likelihood recursive nonlinear filtering, J. Opt. Th. Appl. 2, 386-394.
- Olsson, D. M. and Nelson, L. S. (1975). The Nelder-Mead Simplex Procedure for function minimization, Technometrics 17 (1).
- Ostrowski, A. M. (1967). Contribution to the theory of the method of steepest descent, Arch. Rational Mach. Anal. 26, 257-280.
- Powell, D. R. and MacDonald, J. R. (1972). A rapidly convergent iterative method for the solution of the generalized nonlinear least squares problem, Comput. J. 15, 148-155.
- Powell, M.J.D. (1964). The efficient method of finding the minimum of a function of several variables without calculating derivatives, Comput. J. 7, 155-162.

- Ralston, A. (1965). A first course in numerical analysis, McGraw-Hill Book Co., New York.
- Roth, R. H. (1970). An approach to solving linear discrete optimization problems, J. Assoc. Comput. Mach. 17, 303-313.
- Shah, B. V., Buehler, R. J. and Kempthorne, O. (1964). Some algorithms for minimizing a function of several variables, J. Soc. Indust. App. Math. 12, 74-92.
- Shanno, D. R. (1970). An accelerated gradient projections method for linearly constrained nonlinear estimation, J. Soc. Indust. App. Math. 18, 322-334.
- Stuart, A. (1958). Iterative solutions of likelihood equations, Biometrika 45, 128-130.
- Umland, A. W. and Smith, W. N. (1959). The use of Lagrange multipliers with response surfaces, Technometrics 1, 289-292.
- Visscher, W. M. and Goldman, A. S. (1978). Optimization of earnings in stochastic industries, with applications to casinos, JASA 73, 499-503.
- Wilde, D. J. (1964). Optimum seeking methods, Prentice-Hall, New York.
- Wolfe, P. (1959). The secant method for simultaneous nonlinear equations, Comm. A.C.M. 2, 12-13.

(iii) Mathematical Programming Methods

- Abrham, J. (1961). Convex programming, Econometrica 29, 700-703.
- Andriano, K. (1977). Consistency of the normal equations via linear duality, Commun. Statist. - Simula. Computa. B 6 (1), 97-99.
- Antle, C. E. and Klimko, L. A. (1971). A note on a conjecture of mantel concerning quadratic programming, Technometrics, 13, 425-427.
- Armstrong, R. D. and Frome, E. (1977). A special purpose linear programming algorithm for obtaining least absolute value estimators in a linear model with dummy variables, Comm. Statist. - Simula. Computa. B 6 (4) 383-398.
- Arthanari, T. S. and Dodge, Y. (1981). Mathematical Programming in Statistics, J. Wiley & Sons, New York.
- Francis, R. L. and Wright, G. P. (1969). Some duality relationships for the generalized Neyman-Pearson problem, J. Opt. Th. Appl. 3, 394-412.
- Hanson, M. A. (1961). A duality theorem in nonlinear programming with nonlinear constraints, Aust. J. Statist. 3, 64-72.

- Houthaker, H. S. (1960). The capacity method of quadratic programming, Econometrica 28, 62-96.
- Kao, H.P.C. (1972). Economic screening of a continuously manufactured product, Technometrics 14, 653-661.
- Mantel, N. (1969). Restricted least squares regression and convex quadratic programming, Technometrics 11, 763-773.
- Meinick, E. L. and Yechiali, U. (1975). An application of the simplex method for estimation problems related to contingency tables, Comm. Statist. 4, 1121-1132.
- Mine, H. and Tabata, Y. (1970). Linear programming and continuous Markovian decision problems, J. Appl. Prob. 7, 657-666.
- Nishisato, S. and Arri, P. S. (1975). Nonlinear programming approach to optimal scaling of partially ordered categories, Psychometrika 40, 525-548.
- Schay, G. (1974). Nearest random variables with given distributions, Ann. Prob. 2, 163-166.
- Sethi, V. K. (1963). Solution of a class of programming problems, Sankhyā B 25, 341-344.
- Sielken, R. L. and Hartley, H. O. (1973). Two linear programming algorithms for unbiased estimation of linear models, JASA 68, 639-641.
- Vajda, S. (1958). Inequalities in stochastic linear programming, Bull. Inst. Statist. Inst. 36 (3), 357-363.
- Vinod, H. D. (1969). Integer programming and theory of grouping, JASA 64, 506-519.
- Votaw, D. F. (1960). Statistical programming, Ann. Math. Statist. 31, 1077-1083.
- Wagner, H. M. (1959). Linear programming techniques for regression analysis, J. Amer. Statist. Ass. 54, 206-212.
- Wagner, H. M. (1962). Nonlinear regression with minimal assumptions, J. Amer. Statist. Assoc. 57, 572-578.
- Zahl, S. (1965). Supplement to "A deformation method for quadratic programming", J. R. Statist. Soc. B. 27, 166-168.

(iv) Variational Methods Including Dynamic Programming

- Brown, B. W. (1965). On the iterative method of dynamic programming on a finite space discrete time Markov process, Ann. Math. Statist. 36, 1279-1285.
- Bulirsch, R., Oettli, W. and Stoer, J. (Editors) (1975). Optimization and optimal control, Springer-Verlag, New York.
- Delcoigne, A. and Hansen, P. (1975). Sequence comparison by dynamic programming, Biometrika 62, 661-664.
- Doshi, B. T. (1976). Continuous time control of Markov processes on an arbitrary state space: discounted rewards, Ann. Statist. 4, 1219-1235.
- Dunsmore, I. R. (1969). Regulation and optimization, J. Roy. Statist. Soc. Series B 31, 160-170.
- Harrison, J. M. (1972). Discrete dynamic programming with unbounded rewards, Ann. Math. Statist. 43, 636-644.
- Jensen, R. E. (1969). A dynamic programming algorithm for cluster analysis, Operations Research 12, 1034-1057.
- Jones, P. W. (1975). The two armed bandit, Biometrika 62, 523-524.
- Pruzan, P. M. and Ross Jackson, J. T. (1967). A dynamic programming application in production line inspection, Technometrics 9, 73-81.
- Rustagi, J. S. (1976). Variational methods in statistics, Academic Press, New York.
- Troitskii, V. A. (1971). Variational problems in the theory of optimum processes, J. Opt. Th. Appl. 8, 1-14.
- Veinott, Jr., A. F. (1969). Discrete dynamic programming with sensitive discount optimality criteria, Ann. Math. Statist. 40, 1635-1660.
- Wishart, D. M. (1969). A survey of control theory (with discussion), J. R. Statist. Soc. A 132, 293-319 and 345, 351.

PART II

(i) Designs of Experiments

- Atkinson, A. C. (1969). Constrained maximization and the design of experiments, Technometrics 11 (3), 616-618.
- Atkinson, A. C. and Hunter, W. G. (1968). The design of experiments for parameter estimation, Technometrics 10 (2), 271-289.

- Box, G.E.P. and Wilson, K.B. (1951). On the experimental attainment of optimum conditions, J. R. Statist. Soc 13, 1-45.
- Carney, T. M. and Goldwyn, R. M. (1967). Numerical experiments with various optimal estimators, J. Opt. Th. App. 1, 113-130.
- Conniffe, D. and Stone, J. (1975). Some incomplete block designs of maximum efficiency, Biometrika 62, 685-686.
- Cornell, J. A. and Ott, L. (1975). The use of gradients to aid in the interpretation of mixture response surfaces, Technometrics 17, 409-430.
- Covey-Crump, P.A.K. and Silver, S. D. (1970). Optimal regression designs with previous observations, Biometrika 57, 551-566.
- Evans, J. W. (1979). Computer augmentation of experimental designs to maximize  $|x'x|$ , Technometrics 21 (3), 321-330.
- Evans, J. W. and Manson, A. R. (1978). Optimal experimental designs in two dimensions using minimum bias estimation, JASA 73, 171-176.
- Gaylor, D. W. and Sweeny, H. C. (1965). Design for optimal prediction in simple linear regression, J. Amer. Statist. Ass. 60, 205-216.
- Herzberg, A. M. and Cox, D. R. (1972). Some optimal designs for interpolation and extrapolation, Biometrika 59, 551-561.
- Hoel, P. G. (1965). Minimax designs in two dimensional regression, Ann. Math. Statist. 36, 1097-1106.
- Hoel, P. G. (1965). Optimal designs for polynomial extrapolation, Ann. Math. Statist. 36, 1483-1493.
- Jones, B. (1976). An algorithm for deriving optimal block designs, Technometrics 18, 451-458.
- Kish, L. (1976). Optima and proxima in linear sample designs, JRSS-A 139, 80-95.
- Laycock, P. J. (1972). Convex loss applied to design in regression problems, J. R. Statist. Soc. B, 34, 148-186.
- McLean, R. A. and Anderson, V. L. (1966). Extreme vertices design of mixture experiments, Technometrics 8 (3), 447-454.
- Murty, V. N. and Studden, W. J. (1972). Optimal designs for estimating the slope of a polynomial regression, J. Amer. Statist. Ass. 67, 869-873.
- Neuhardt, J. and Bradley, J. (1971). On selection of multi-factor experimental arrangements with resource constraints, J. Amer. Statist. Ass. 66, 618-621

- Ott, R. L. and Myers, R. H. (1968). Optimal experimental designs for estimating the independent variable in regression, Technometrics 10 (4), 811-823.
- Owen, R. J. (1970). The optimum design of two-factor experiment using prior information, Ann. Math. Statist. 41, 1917-1934.
- Pazman, A. (1978). Computation of the optimum designs under singular information matrices, Ann. Statist. 6, 465-467.
- Perng, S. K. and Tong, Y. L. (1977). Optimal allocation of observations in inverse linear regression, Ann. Statist. 5, 191-196.
- Rasmussen, S. L. and Starr, N. (1979). Optimal and adaptive stopping in the search for new species, JASA 74, 661-667.
- Silvey, S. D., Titterington, D. M. and Torsney, B. (1978). An algorithm for optimal designs on a finite design space, Comm. Statist. A 7.
- Spendley, W., Hext, G. R. and Hinsworth, F. R. (1962). Sequential application of simplex designs in optimization and evolutionary operation, Technometrics, 4 (4), 441-462.
- Srivastava, J. N. and Anderson, D. A. (1970). Optimal fractional factorial plans for main effects orthogonal to two-factor interactions  $2^m$  series, J. Amer. Statist. Ass. 65, 828-843.
- Studden, W. J. and Tsay, J. Y. (1976). Remez's procedure for finding optimal designs, Ann. Statist. 4, 1271-1279.

#### (ii) Estimation and Testing Hypotheses

- Beran, R. (1977). Minimum Hellinger distance estimates for parametric models, Ann. Math. Statist. 5, 445-463.
- Brons, H. K., Brunk, H. D., Franck, W. E. and Hanson, D. L. (1969). Generalized means and associated families of distributions, Ann. Math. Statist. 40, 339-355.
- Coberly, W. A. (1976). The numerical evaluation of the maximum likelihood estimates for mixture of proportions, Commun. Statist. A 5, 1127-1135.
- Collins, J. R. (1976). Robust estimation of a location parameter in the presence of asymmetry, Ann. Statist. 4, 68-85.
- Copas, J. B. (1975). On the modality of the likelihood for the Cauchy distribution, Biometrika 62, 701-704.
- Cox, N. R. (1976). A note on the determination of the nature of turning points of likelihoods, Biometrika 63, 199-201.
- Gebski, V. J. (1975). Solving the maximum likelihood equations of the Poisson-Pascal distribution using inverse interpolation, Scand. Actuarial J., 203-206.

- Hasselblad, V. (1966). Estimation of parameters for a mixture of normal distributions, Technometrics 8, 431-446.
- Ireland, C. T. and Kullback, S. (1968). Contingency tables with given marginals, Biometrika 55, 179-188.
- Jacobson, H. I. (1969). The maximum variance of restricted unimodal distributions, Ann. Math. Statist. 40, 1746-1762.
- Konijn, H. S. (1966). Some remarks on the choice of systems of confidence intervals, Sankhya A 28, 305-308.
- Mandl, P. (1969). Lagrange multipliers and optimization of nonterminating Markov chains, Kybernetika 5, 513-519.
- Mann, N. R. (1969). Optimum estimators for linear functions of location and scale parameters, Ann. Math. Statist. 40, 2149-2155.
- Mazumdar, M. (1980). An optimum component testing procedure for a series system with redundant subsystems, Technometrics 22, 23-27.
- Purscha, H. (1976). Maximum likelihood estimation in linear learning models, Biometrika 63, 537-542.
- Spjotvoll, E. (1972). On the optimality of some multiple comparison procedures, Ann. Math. Statist. 43, 398-411.
- Yottani, T. (1971). An investigation on the strategy maximizing a mathematical expected value, Res. Bull. Fac. Ed. Oita. Univer. 1, 3-8.

### (iii) Least Squares Theory

- Armstrong, R. D. and Frome, E. L. (1976). A branch-and-bound solution of a restricted least squares problem, Technometrics 18 (4), 447-450.
- Bray, J. (1971). Dynamic equations for economic forecasting with the GDP-unemployment relation and the growth of GDP in the United Kingdom as an example, J. R. Statist. Soc. A 134, 167-228.
- Businger, P. and Golub, G. H. (1965). Linear least squares solution by householder transformation, Numerische Mathematik 7, 269-276.
- Chipman, J. S. (1964). On least squares with insufficient observations, JASA 59, 1078-1111.
- Dolby, G. R. (1972). Generalized least squares and maximum likelihood estimation of nonlinear functional relationships, J. R. Statist. Soc. B 34, 393-400.

- Gabriel, K. R. and Peritz, E. (1973). Least squares and maximal contrasts, Int. Statist. Rev. 41, 155-164.
- Goldberger, A. S. and Jochims, D. B. (1961). Note on stepwise least squares, J. Amer. Statist. Ass. 56, 105-110.
- Goldstein, A. J. and Kruskal, J. B. (1976). Least-squares fitting by monotonic functions having integer values, JASA 71, 370-373.
- Hudson, D. J. (1969). Least squares fitting of a polynomial constrained to be either non-negative, non-decreasing or convex, JRSS B 31, 113-118.
- Klemm, R., Sposito, Y. A. and Pyne, D. (1974). Useful least squares solutions over inequality restrictions, J. Statist. Res. (Pakistan) 8, 80-95.
- Klimko, L. A. and Nelson, P. I. (1978). On conditional least squares estimation for stochastic processes, Ann. Statist. 6, 629-642.
- Liew, C. K. (1976). Inequality constrained least-squares estimation, J. Amer. Statist. Assoc. 71, 746-751.
- Miller, R. (1976). Least squares regression with censored data, Biometrika 63, 449-464.
- Minder, C. E. and McMillan, I. (1977). Estimation of linear compartmental model parameters using marginal likelihood, Biometrics 33, 333-341.
- Pierce, D. A. (1972). Least squares estimation in dynamic disturbance time series model, Biometrika 59, 73-78.
- Plackett, R. L. (1972). Studies in the history of probability and statistics, the discovery of method of least squares, Biometrika 59, 239-261.
- Waterman, M. S. (1974). A restricted least squares problem, Technometrics 16, 135-136.

#### (iv) Regression Analysis

- Armstrong, R. D. and Frome, E. L. (1978). A remark on algorithm AS108: Multiple linear regression with minimum sum of absolute errors, Appl. Statist. 27, 378.
- Baldwin, K. F. and Hoerl, A. E. (1978). Bounds on minimum mean squared error in ridge regression, Comm. Statist. A 7, 1209-1248.
- Bartels, R. H. and Conn, A. R. (1977). Least absolute value regression: A special case of piecewise linear minimization, Commun. Statist. - Simula. Computa. B 6, 329-339.

- Charnes, A., Frome, E. L. and Yu, P. L. (1976). The equivalence of iterated weighted least squares and maximum likelihood estimates in the exponential family, JASA 71, 169-171.
- Farebrother, R. W. (1975). The minimum mean square error linear estimation and ridge regression, Technometrics 17, 127-128.
- Flanagan, P. D. Vitale, P. A. and Mendelsohn, J. (1969). A numerical investigation of several one-dimensional search procedures in nonlinear regression problems, Technometrics 11 (2), 265-284.
- Forsythe, A. B. (1972). Robust estimation of straight line regression coefficients by minimizing pth power deviations, Technometrics 14, 159-166.
- Greenberg, E. (1975). Minimum variance properties of principal component regression, J. Amer. Statist. Assoc. 70, 194-197.
- Hemmerle, W. J. (1975). An explicit solution for generalized ridge regression, Technometrics 17, 309-314.
- Heller, N. B. and Staats, G. E. (1973). Response surface optimization when experimental factors are subject to costs and constraints, Technometrics 15, (1), 113-123.
- Hemmerle, W. J. and Brantle, T. F. (1978). Explicit and constrained generalized ridge estimation, Technometrics 20 (2), 109-120.
- Kennedy, W. J. and Gentle, J. E. (1978). Comparisons of algorithms for minimum  $L_p$  norm linear regression, P. Comp. Sc. Statist. 10, 373.
- Kubicek, M. Marek, M. and Eckert E. (1971). Quasilinearized regression, Technometrics 13 (3), 601-608.
- Smith, F. B. and Shanno, D. F. (1971). An improved Marquardt procedure for nontinear regressions, Technometrics 13 (1), 63-74.

#### (v) Multivariate Analysis

- Anderson, J. A. (1972). Separate sample logistic discrimination, Biometrika 59, 19-35.
- Chanda, K. C. (1962). On bounds of serial correlations, Ann. Math. Statist. 33, 1457-1460.
- Chattopadhyay, A. K. Pillai, K.C.S. and Li, W. C. (1976). Maximization of an integral of a matrix function and asymptotic expansions of distributions of latent roots of two matrices, Ann. Statist. 4, 796-806.
- Chernoff, H. (1973). Some measures of discrimination between normal multivariate distributions with unequal covariance matrices, Mult. Anal. III, (Editor, P. R. Krishnaiah), Academic Press, New York, 334-337.

- Jobson, J. D. and Fuller, W. A. (1980). Least squares estimation when the covariance matrix and parameter vector are functionally related, JASA 75, 176-181.
- Eaton, M. L. (1976). A maximization problem and its application to canonical correlation, J. Mult. An. 6, 422-425.
- Okamoto, M. and Kanazawa, M. (1968). Minimization of eigen values of a matrix and optimality of principal components, Ann. Math. Statist. 39, 859-863.
- Solomon, D. L. (1972). A minimax estimation of a multivariate location parameter, J. Amer. Statist. Ass. 67, 641-646.
- Theobald, C. M. (1975). An inequality with application to multivariate analysis, Biometrika 62, 461-466.
- Watson, G. S. (1964). A note on maximum likelihood, Sankhyā A 26, 303-304.

#### (vi) Sampling

- Bechhofer, R. E. (1967). A two-stage subsampling procedure for ranking means of finite populations with an application to bulk sampling problems, Technometrics 9 (3), 355-364.
- Bechhofer, R. E. and Nocturne, D. J. (1972). Optimal allocation of observations when comparing several treatments with a control; II: 2-sided comparisons, Technometrics 14, 423-436.
- Chaddha, R. L., Hardgrave, W. W., Hudson, D. J., Segal, M., and Suurballe, J. W. (1971). Allocation of total sample size when only the stratum means are of interest, Technometrics 13, 817-831.
- Ericson, W. A. (1965). Optimum stratified sampling using prior information, JASA 60, 750-771
- Huddleston, H. F. and Claypool, P. L. (1970). Optimal sample allocation to strata using convex programming, Appl. Statist. 19, 273-278.
- Kokan, A. R. and Khan, S. U. (1967). Optimum allocation in multivariate surveys: an analytical solution, JRSS B 29, 115-125.
- Levy, P. S. (1977). Optimum allocation in stratified random network sampling for estimating the prevalence of attributes in some populations, JASA 72, 758-763.
- Rao, M. R. (1971). Cluster analysis and mathematical programming, J. Amer. Statist. Ass. 66, 622-626.
- Somerville, P. N. (1970). Optimum sample size for a problem in choosing the population with the largest mean, J. Amer. Statist. Ass. 65, 763-775.

Steve, J. (1976). On the optimal use of multiauxiliary information, J. Amer. Statist. Assoc. 71, 679.

(vii) Sequential and Search Procedures

Chakravarti, I. M. (1976). Search in the presence of noise, Sankhyā A 38, 381-393.

Cleroux, R. and Hanscom, M. (1974). Age replacement with adjustment and depreciation costs and interest charges, Technometrics 16, 235-240.

Freeman, P. R. (1970). Optimal Bayesian sequential estimation of median effective dose, Biometrika 57, 79-89.

Haggstrom, G. W. (1967). Optimal sequential procedures when more than one stop is required, Ann. Math. Statist. 38, 1618-1626.

Hall, Jr., G. J. (1976). Sequential search with random overlook probabilities, Ann. Statist. 4, 807-816.

Kadane, J. B. and Simon, H. A. (1977). Optimal strategies for a class of constrained sequential problems, Ann. Statist. 5, 237-255.

Robinson, J. A. (1978). Sequential choice of an optimal dose: A prediction intervals approach, Biometrika 65, 75-78.

Schmidt, J. W. and Taylor, R. E. (1973). A dual purpose cost based quality control system, Technometrics 15, 151-166.

(viii) Stochastic Approximation Methods

Albert, A. E. and Gardner, Jr., L. A. (1967). Stochastic Approximation and nonlinear regression, MIT Press, Cambridge, Mass.

Blum, J. R. (1954). Approximation methods which converge with probability one, Ann. Math. Statist. 25, 382-386.

Blum, J. R. (1954). Multidimensional stochastic approximation methods, Ann. Math. Statist. 25, 737-744.

Blum, J. R. (1958). A note on stochastic approximation, Proc. Amer. Math. Soc. 9, 404-407.

Burkholder, D. (1956). On a class of stochastic approximation processes, Ann. Math. Statist. 27, 1044-1059.

Chung, K. L. (1954). On a stochastic approximation method, Ann. Math. Statist. 25, 463-483.

Derman, C. (1956). Stochastic approximation, Ann. Math. Statist. 27, 879-886.

- Derman, C. and Sacks, J. (1959). On Dvoretzky's stochastic approximation theorem, Ann. Math. Statist. 30, 601-606.
- Dupac, V. (1965). A dynamic stochastic approximation method, Ann. Math. Statist. 36, 1695-1702.
- Fabian, V. (1960). Stochastic approximation methods, Czechoslovak Math. 10, 123-159.
- Hodges, J. and Lehmann, E. (1956). Two approximations to Robbins-Munro process, Proc. Third Berkeley Symp., Math. Statist. and Prob. 1, 95-104.
- Kallianpur, G. (1954). A note on the Robbins-Monro stochastic approximation method, Ann. Math. Statist. 25, 386-388.
- Kiefer, J. and Wolfowitz, J. (1952). Stochastic estimation of the maximum of a regression function, Ann. Math. Statist. 23, 462-466.
- Krasulina, T. P. (1962). A note on some stochastic approximation processes, Theor. Probability Appl. 7, 108-113.
- Kushner, H. J. and Clark, D. S. (1978). Stochastic approximation methods for constrained and unconstrained systems, Springer-Verlag, New York.
- Robbins, H. and Monro, S. (1951). A stochastic approximation method, Ann. Math. Statist. 22, 400-407.
- Shimizu, T. (1969). A stochastic approximation method for optimization problems, J. Assoc. Comput. Mach. 16, 511-516.
- Wasan, M. T. (1969). Stochastic approximation, Cambridge University Press, London.
- Wolfowitz, J. (1956). On stochastic approximation methods, Ann. Math. Statist. 27, 1151-1156.